Influenza Virus

Influenza, commonly called the flu, is an infectious disease caused by an RNA virus of the Orthomyxovirus family. This is an enveloped virus with single stranded negative sense linear genome. The genome is also segmented into 8 segments and has helical protein capsid. Virulence mechanisms include hemagglutinin, which is an antigenic glycoprotein found on the surface of influenza viruses that aids in viral entry of a cell and neuraminidase, an enzyme that plays an important role in the release of virion progeny from infected cells. This virus has the capacity to undergo reassortment of the genome to cause major changes in the strain of influenza. This major change is commonly referred to as genetic shift and can be highly dangerous because the human immune system has difficulty recognizing the new strain of virus. In contrast, genetic drift refers to minor antigenic mutations that occur and are associated with gradual loss of immunity. Common symptoms of influenza virus include chills, fever, sore throat, muscle pains, headache, and fatigue. Complications include Reye's syndrome, a potentially fatal disease commonly associated with salicylate use in children with influenza, and the virus can also be a trigger for Guillan-Barre.



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Characteristics

RNA Virus
RNA-rhino
This virus is an RNA virus, meaning its genetic code consists of ribonucleic acid as opposed to deoxyribonucleic acid.

Orthomyxovirus
Oar-mixer
Influenza is part of the Orthomyxovirus family and includes Influenzavirus A, B, and C.

Enveloped
Envelope
This virus contains an envelope, which is an outer membrane that covers the protein capsid and helps the virus enter host cells.

Negative Sense
Negative-sign on rhino
Influenza virus genome consists of single stranded negative sense linear RNA. Negative-sense, 3' to 5' viral RNA genome is complementary to viral mRNA. Therefore, the genome must be converted to positive-sense RNA by an RNA polymerase before translation can occur. Viruses with negative-sense genomes must carry an RNA polymerase inside the virion in order to replicate.

8 Segments
(8) Ball segway
The viral genome of influenza is segmented and consists of 8 segments.

Helical
Helical-shape
The influenza virus has a helical shape as opposed to icosahedral.

Hemagglutinin for Viral Entry
Ham-glue-beads in Entrance
Hemagglutinin is an antigenic glycoprotein found on the surface of influenza viruses. This structure is responsible for binding the virus to the cell that is infected and aids in viral entry. This protein structure is called hemagglutinin because of the ability to cause red bloods to clump.

Neuraminidase for Virion Release
Neuron-mini-daisies Releasing
This is an enzyme that catalyzes the hydrolysis of terminal sialic acid residues from newly formed virions and plays an important role in release of virion progeny from the infected cell.

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Genetic Shift

Gear Shift

Genetic shift refers to the process by which two or more different strains of a virus undergo a reassortment of their genomes to combine and form a new subtype that has a mixture of the surface antigens. When two different strains of influenza infect the same cell simultaneously, their viral genomes can be combined. Because the human immune system has difficulty recognizing the new strain, it can be highly dangerous.

Reassortment of genome to cause major change

Army-Major standing on Assortment of chocolates

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Genetic Drift

Drift Wood

Genetic drift refers to the natural mutation over time of known strains of influenza. Unlike genetic shift, these changes are minor antigenic mutations and are not associated with worldwide pandemics.

Minor Antigenic Mutations

Mini Ant-gems Mutating

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Considerations

Reye Syndrome with Aspirin Use

Light-Rays in Aspirin-bottle

Reye's syndrome is a potentially fatal disease characterized by a rash, vomiting, and liver damage. The exact mechanism of disease is poorly understood but commonly associated with salicylate use in children with viral illness including influenza.

Guillain-Barre Syndrome

Green Beret

This is an acute disorder of the peripheral nervous system characterized by ascending paralysis that begins in the hands or feet and migrates towards the trunk. If the respiratory muscles are affected, it can cause life-threatening complications. Influenza is known to be a trigger for Guillain-Barre syndrome.

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